US006424623B1

(12) **United States Patent**
Borgstahl et al.

(10) **Patent No.: US 6,424,623 B1**
(45) **Date of Patent: Jul. 23, 2002**

(54) **VIRTUAL QUEUING SYSTEM USING PROXIMITY-BASED SHORT-RANGE WIRELESS LINKS**

(75) Inventors: **Ronald William Borgstahl**, Phoenix; **Jeffrey Martin Harris**, Chandler; **Ernest Earl Woodward**, Chandler; **William Bryan Austin**, Chandler; **George William Muncaster**, Phoenix, all of AZ (US); **Morris Anthony Moore**, Southlake, TX (US); **John Douglas Reed**, Arlington, TX (US); **Eric Reed Schorman**, Bedford, TX (US)

(73) Assignee: **Motorola, Inc.**, Schaumburg, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/454,846**

(22) Filed: **Dec. 7, 1999**

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/104,631, filed on Jun. 25, 1998, which is a continuation-in-part of application No. 08/729,207, filed on Oct. 15, 1996, now Pat. No. 6,069,896.

(51) **Int. Cl.**[7] **G01R 31/08**

(52) **U.S. Cl.** **370/230**; 370/338; 370/349; 370/412

(58) **Field of Search** 370/338, 341, 370/349, 464, 465, 471, 328, 401, 402, 403, 412, 429, 313, 230, 310, 431, 438, 449

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,006,983	A		4/1991	Wayne et al. 364/401
5,502,806	A		3/1996	Mahoney et al. 395/161
5,724,520	A		3/1998	Goheen 395/205
5,812,955	A	*	9/1998	Dent et al. 455/561
5,898,831	A	*	4/1999	Hall et al. 713/201
5,909,183	A	*	6/1999	Borgstahl et al. 340/825.22
5,948,040	A		9/1999	DeLorme et al. 702/201
5,949,777	A	*	9/1999	Uyesugi et al. 370/345
6,069,896	A	*	5/2000	Borgstahl et al. 370/401

* cited by examiner

Primary Examiner—Chau Nguyen
Assistant Examiner—Soon-Dong Hyun
(74) *Attorney, Agent, or Firm*—R. Louis Bredden; Hisashi D. Watanabe

(57) **ABSTRACT**

A peer device **(132)** is arranged and programmed for maintaining a virtual queue for an event, and a personal presence identifier **(122)** is carried by a user and coupled to the peer device by a short-range two-way wireless link. The peer device and the personal presence identifier are arranged and programmed to establish (58) a two-way personal area network with one another when the personal presence identifier is within wireless transmission range of the peer device. The personal presence identifier and the peer device are also arranged and programmed to exchange (82) needs specifications and capability specifications with one another after establishing the two-way personal area network.

20 Claims, 8 Drawing Sheets